REMOTE POWER CYCLING OF PERIPHERAL DATA STORAGE SYSTEM

[0001] This invention relates to peripheral data storage systems. More particularly, the present invention is directed to a method for remote power cycling of peripheral data storage systems.

BACKGROUND OF THE INVENTION

[0002] External peripheral data storage systems such as external disk drives and card readers are standalone units that are commonly mounted to and communicate with a host computer, generally via an external cable such as a universal serial bus (USB) cable or Firewire™ cable.

[0003] One wide-spread use of an external peripheral data storage systems is for creating backups of data in the host system so to minimize the risk of a permanent loss or corruption of data due to a hardware or software damage to the host system. The backup operation may be a scheduled operation wherein the host system is configured to routinely backup data to the external peripheral data storage systems at pre-selected times, such as every midnight. In current products, however, even though a host system performs a scheduled backup operation to a external peripheral data storage system at a pre-selected time(s), the external peripheral data storage system is often kept in an ON state by a user at all times to reduce the occurrence of an OFF state of the external peripheral data storage system during a scheduled backup time, particularly if the backup is scheduled for a time when the user is unavailable to return the peripheral data storage system to an ON state. As such, the external peripheral data storage systems are left in an ON state for longer than necessary, resulting in inefficient power usage and reducing the overall longevity of the external peripheral data storage system.

[0004] Accordingly, what is needed is a method for facilitating the power cycling of a peripheral data storage system for performing of scheduled backup operations to peripheral data storage system.

SUMMARY OF THE INVENTION

[0005] This invention can be regarded as a method for remotely power cycling a peripheral data storage system from a host system. The method comprises powering-up the peripheral data storage system from the host system based on a host-scheduled backup operation; transmitting pre-selected data to the peripheral data storage system from the host system based on the host-scheduled backup operation; and powering-down the peripheral data storage system from the host system based on the host-scheduled backup operation.

[0006] This invention can also be regarded as a method of operating a peripheral data storage system for use with a host system configured to perform scheduled backup operations to the peripheral data storage system, the peripheral data storage system comprising a peripheral data storage device, a peripheral data storage system controller, and a peripheral data storage controller host interface adapted for communication with the host system. The method comprises powering-up the peripheral data storage system based on a host-scheduled backup operation; receiving data from the host system for storing in the peripheral data storage device; and powering-down the peripheral data storage system based on the host-scheduled backup operation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] **FIG. 1** illustrates an exemplary peripheral data storage system in which the embodiments of the present invention may be practiced.

[0008] **FIG. 2A-C** are flow charts illustrating a method of the present invention used in the exemplary peripheral data storage system shown in **FIG. 1**.

[0009] **FIG. 3A-C** are flow charts illustrating another method of the present invention used in the exemplary peripheral data storage system shown in **FIG. 1**.

DETAILED DESCRIPTION OF THE INVENTION

[00010] With reference to **FIG. 1**, an exemplary peripheral data storage system 10 is shown in which the embodiments of the present invention for operating a peripheral data storage system 10 for use with a host system 30 configured to perform scheduled backup operations to the peripheral data storage system 10 may be practiced. As shown in FIG. 1, the peripheral data storage system 10, such as an external disk drive system, comprises a peripheral data storage device 40, such as a disk drive, a peripheral system controller 20, and a peripheral system controller host interface 21 adapted for communication with the host system 30 via the communication medium 31, such as a universal serial bus (USB) cable or a Firewire™ cable. Suitably, the peripheral data storage system controller 20 is a bridge controller and the peripheral data storage controller host interface 21is a bridge controller host interface. During the operations of the data storage device 40, the peripheral system controller 20 transmits command 63 to the power switch 60 for providing the data storage device 40 with a DC operating current 62 inputted via line 61 from an external power source (not shown).

[00011] **FIG. 2A** is a flow chart describing a process of the present invention for remotely power cycling the peripheral data storage system 10 from the host system 30 used in the exemplary peripheral data storage system 10 shown in FIG. 1. As shown in FIG. 2A. The process begins in block 200 in which the peripheral data storage system 10 is powered-up from the host system 30 based on a host-scheduled backup operation as described below and in greater detail in conjunction with FIG. 2B. Suitably, the powering-up is performed periodically at a pre-scheduled time corresponding to the host-scheduled backup operation, such as at every midnight. Suitably, the host-scheduled backup operation is configured in the host system 30 prior to the powering-up. Next, in block 202, the pre-selected data is transmitted to the peripheral data storage system 10 from the host system 30 based on the host-scheduled backup operation. Suitably, the host system 30 comprises a host data storage system 33 in which the pre-selected data resides. Suitably, a portion of host data is pre-selected during the configuring of the host system 30 prior to the powering-up for the host-scheduled backup operations of the selected portion to the peripheral data storage system 10. Next, in block 206, the peripheral data storage system 10 is powered-down from the host system 30 based on the host-scheduled backup operation as described below and in greater

detail in conjunction with FIG. 2C. Suitably, the host system 30 determines if the transmitted pre-selected data were stored in the peripheral data storage system 10 prior to powering-down the peripheral storage system 10. The flow then proceeds to block 208 in which the overall process ends.

[00012] **FIG. 2B** describes in greater detail the powering-up process described in block 200 of FIG. 2A. As shown in FIG. 2B, the process begins in block 210 wherein a power-up command is transmitted from the host system 30 to the peripheral data storage system 10. In one exemplary embodiment, the power-up command causes the peripheral data storage system 10 to supply power to the peripheral data storage device 40 from an external power supply source (not shown). In another exemplary embodiment, the powering-up comprises powering-up the peripheral storage device 40 pursuant to the receipt of a power-up command transmitted from the host system 30. In this embodiment, the data storage system controller 20 (such as a bridge controller) remains in an ON state at all times in anticipation of the receipt of the power-up command for powering-up of the peripheral data storage device 40. The flow then proceeds to block 212 for returning to block 200 of FIG. 2A.

[00013] **FIG. 2C** describes in greater detail the powering down process described in block 206 of FIG. 2A. As shown in FIG. 2C, the process begins in block 214 wherein a power-down command is transmitted from the host system 30 to the peripheral data storage system 10. In one exemplary embodiment, the power-down command causes the peripheral data storage system 10 to cease supplying power to the peripheral data storage device 40 from an external power supply source (not shown). In another exemplary embodiment, the powering-down comprises powering-down the peripheral storage device 40 pursuant to the receipt of a power-down command transmitted from the host system 30. In this embodiment, the data storage system controller 20 (such as a bridge controller) remains in an ON state at all times in anticipation of the receipt of the power-down command for powering-down of the peripheral data storage device 40. The flow then proceeds to block 216 for returning to block 206 of FIG. 2A.

[00014] In another exemplary embodiment, the powering-up of block 200 is achieved by supplying operating power to the peripheral data storage system 10 from the host

system 30 and the powering-down of block 206 is achieved by ceasing the supplying of operating power to the peripheral data storage system 10 from the host system 30.

[00015] **FIG. 3A** is a flow chart describing another process of the present invention for remotely power cycling the peripheral data storage system 10 from the host system 30 used in the exemplary peripheral data storage system shown in FIG. 1. As shown in FIG. 3A. The process begins in block 300 in which the peripheral data storage system 10 is powered-up from the host system 30 based on a host-scheduled backup operation as described below and in greater detail in conjunction with FIG. 3B. Suitably, the powering-up is performed periodically at a pre-scheduled time corresponding to the host-scheduled backup operation, such as at every midnight. Next, in block 302 data is received by the peripheral data storage system 10 from the host system 30 for storing in the peripheral data storage device 40. Next, in block 306, the peripheral data storage system 10 is powered-down based on the host-scheduled backup operation as described below in greater in conjunction with FIG. 3C. Suitably, the peripheral data storage system 10 determines if the received data were stored in the peripheral data storage system 10 prior to powering-down the peripheral storage system 10. The flow then proceeds to block 308 in which the overall process ends.

[00016] **FIG. 3B** describes in greater detail the powering-up process described in block 300 of FIG. 3A. As shown in FIG. 3B, the process begins in block 310 wherein a power-up command is received from the host system 30 for powering-up of the peripheral data storage system 10. In one exemplary embodiment, the power-up command causes the peripheral data storage system 10 to supply power to the peripheral data storage device 40 from an external power supply source (not shown). In another exemplary embodiment, the powering-up comprises powering-up the peripheral storage device 40 pursuant to the receipt of a power-up command from the host system 30. In this embodiment, the data storage system controller 20 (such as a bridge controller) remains in an ON state at all times in anticipation of the receipt of the power-up command for powering-up of the peripheral data storage device 40. The flow then proceeds to block 312 for returning to block 300 of FIG. 3A.

[00017] **FIG. 3C** describes in greater detail the powering down process described in block 306 of FIG. 3A. As shown in FIG. 3C, the process begins in block 314 wherein a power-down command is received from the host system 30 for powering-down of the

peripheral data storage system 10. In one exemplary embodiment, the power-down command causes the peripheral data storage system 10 to cease supplying power to the peripheral data storage device 40 from an external power supply source (not shown). In another exemplary embodiment, the powering-down comprises powering-down the peripheral storage device 40 pursuant to the receipt of a power-down command from the host system 30. In this embodiment, the data storage system controller 20 (such as a bridge controller) remains in an ON state at all times in anticipation of the receipt of the power-down command for powering-down of the peripheral data storage device 40. The flow then proceeds to block 316 for returning to block 306 of FIG. 3A.

[00018] In other exemplary embodiments, the powering-up of block 300 may be achieved by receiving operating power from the host system 30 and the powering-down of block 306 is achieved by ceasing the receiving of operating power from the host system 30. Suitably, the powering-down of block 306 may also be achieved by a self-powering-down by the peripheral data storage system 10 after a predetermined timeout period following the storing of the data received from the host system 30.

[00019] One advantage of the foregoing feature of the present invention over the prior art is that by power cycling the peripheral data storage system 10 based on a host-scheduled backup operation, the need for leaving the peripheral data storage system 10 in an ON state at all times is minimized, thus reducing the associated inefficient power usage and the reduction in overall longevity of the external peripheral data storage system 10.

[00020] It should be noted that the various features of the foregoing embodiments were discussed separately for clarity of description only and they can be incorporated in whole or in part into a single embodiment of the invention having all or some of these features.